Big Skywarn

Spotter Newsletter

Newsletter of the Great Falls Weather Forecast Office
5324 Tri-Hill Frontage Road
Great Falls, MT 59404
Autumn 2008

Inside This Issue

From the Desk of the MIC

Dear Reader,

Welcome to the Autumn 2008 newsletter from the National Weather Service Office in Great Falls, Montana. I am the Meteorologist-In-Charge at the Great Falls Forecast Office, where I am in charge of over 20 staff members who play a critical role in the dissemination of forecasts, warnings, and other products that you, the taxpayer, use on a regular basis. We serve the residents of north central, central, and southwest Montana, all the way from the Canadian border to the Idaho border. Did you know that it costs each United States resident only $2.78 per year to support the entire National Weather Service? In short, our goal is to protect lives and property by providing the latest and most up to date weather information that is accessible to all members of the community. If you would like more information about what we do, or if you would be interested in a tour of our office, please give us a call at 406-453-2081.

Sincerely,
Michael Mercer

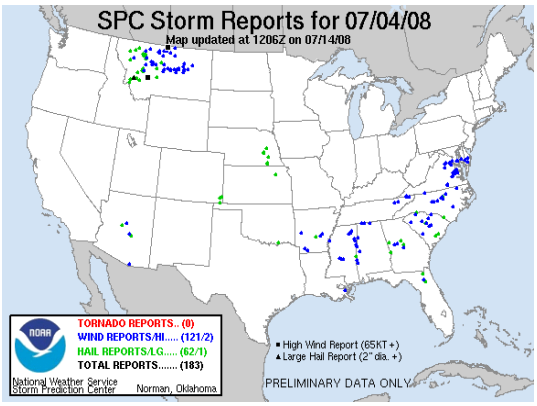
The Voice of the National Weather Service NOAA ALL HAZARDS RADIO

The National Weather Service in Great Falls operates 8 NOAA All Hazards Radio stations — Great Falls, Helena, Havre, Conrad, Bozeman, Lewistown, Browning and Dillon. Each has a dedicated transmitter that provides 24/7 weather forecasts, watches, warnings, advisories and climate information, as well as civil emergency messages, AMBER alerts and much more.

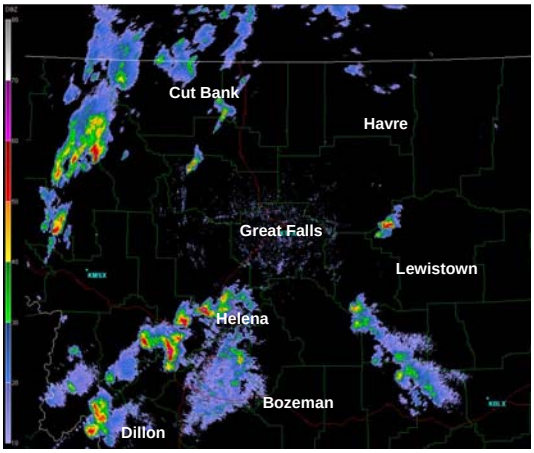
You can obtain a NOAA All Hazards Radio with SAME (Specific Area Message Encoding) technology that can be specifically programmed to alert for watches and warnings for your county only. Your NWR will then alert you **only** of weather and other emergencies for the county(s)/ area(s) you have programmed. NWR receivers without the SAME capability alert for emergencies anywhere within the coverage area of the NWR transmitter, typically several counties, even though the emergency could be well away from the listener.

The NOAA All Hazards Radio warning alarm tone is tested by the National Weather Service each Wednesday between 1100 a.m. and noon MDT. For more information on NOAA All Hazards Radio, please visit our web site ... www.nws.noaa.gov/nwr.

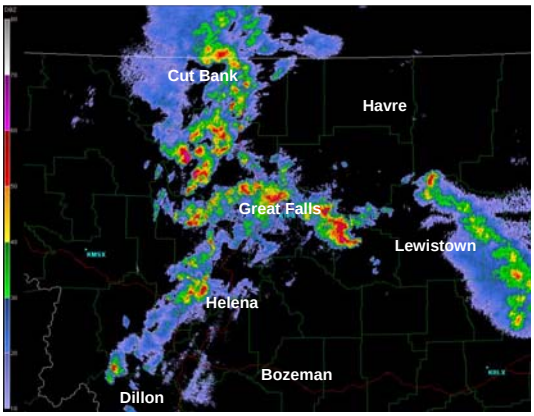
Forecaster Ariel Cohen reading the test message live on NOAA All Hazards Radio.



Severe Weather Reports across the nation on July 4, 2008.



Radar image at 4:28 PM MDT on July 4, 2008 showing severe thunderstorms developing over southwest and central Montana



Radar image at 6:42 PM MDT on July 4, 2008 showing severe thunderstorms approaching Great Falls.

July 4 Severe Weather Outbreak

By Ariel Cohen

The most significant severe weather event of 2008 across north central, central, and southwest Montana occurred on Friday, July 4, affecting most every county of our County Warning Area. While severe thunderstorms occur most frequently during the summer months in Montana, this event was unusual in that such a large area was affected by severe weather. In fact, the National Weather Service Forecast Office in Great Falls issued a total of 35 Severe Thunderstorm Warnings and 2 Tornado Warnings between 1 p.m. and 10 p.m. MDT on Friday.

Meteorologists at the National Weather Service in Great Falls were alerting the public to the severe weather threat in Hazardous Weather Outlooks, Area Forecast Discussions, and the routine forecast in the days prior to the event. Amateur radio operators were called in during the event to monitor the amateur radio network for storm reports. Numerous spotters were also called during and after the event to collect storm reports. All of these reports were critical in aiding radar operators and other NWS staff in warning operations, as well as providing ground truth of what was seen on radar.

> *...rotating updrafts were noted according to radar, suggesting the potential for large hail.*

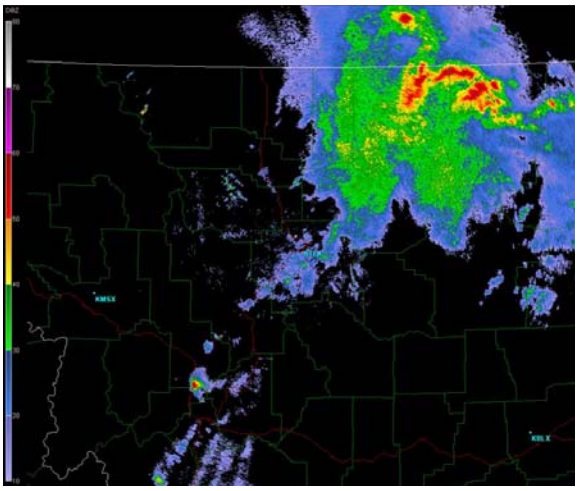
The first storms of the day formed west of the continental divide in the morning and early afternoon, occasionally clipping the northwesternmost portions of Glacier County before moving into Alberta. These storms resulted in an outflow boundary drifting southward later in the day, which could have further aided in storm intensification in the afternoon. Throughout mid-day, low level Gulf moisture was pooling into far north central Montana on southeasterly surface winds, while Pacific moisture was pooling into the remainder of the region on westerly surface winds. By 3 p.m. , storms started to fire over north central Montana, with more storms forming west of Helena.

Between 3 p.m. and 6 p.m. , most of the storms were isolated from near Helena to Great Falls, with the storms more spotty over far southwest Montana. Occasionally, storms were found to exhibit supercellular characteristics, by which rotating updrafts

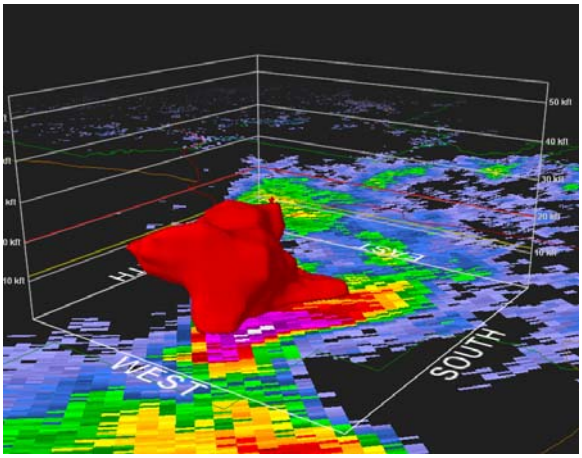
were noted according to radar, suggesting the potential for large hail. Numerous reports of golfball size hail were received during this time, with a particularly intense storm potentially containing even larger hail near Marysville and Canyon Creek.

Between 6 p.m. and 10 p.m., storms began to consolidate into lines as they marched northeastward over central and north central Montana, resulting in widespread wind damage and reports of 70 mph wind gusts or higher. In fact, a train containing Oreo cookies west of Havre was reported to have been derailed, scattering the cookies near the tracks. Wind damage was reported south of Great Falls, as well. The damaging winds continued long after the bulk of the thunder and lightning ended. After 10 p.m., most of the showers and thunderstorms had moved into Canada, bringing an end to the severe weather threat.

The images on pages 2 and 3 show storm report and radar imagery from the NWS Great Falls radar at 4:28 PM, 6:41 p.m., and 8:59 p.m. The red and purple colors on the radar images indicate the potential for hail and very heavy rain. The images below shows forecasters responsible for issuing the severe weather warnings during the event. Remember, as always, please call our spotter line when it is safe to do so to report any instances of hail penny size (3/4 inches) or larger, winds gusting to at least 58 MPH, or tornadoes. Don't assume that we have received a report if a warning has already been issued. Again, please don't hesitate to provide your report.



Radar image at 8:59 PM MDT on July 4, 2008 showing



3-D visualization of a storm that produced very large hail near Canyon Creek in Lewis and Clark County

How can I help the National Weather Service?

We can only see what's right in front of us, so reports of hazardous weather are always appreciated. If you experience any of the following, whether or not a warning or watch is currently in effect, please give us a call at 406-453-2081. As always—***Thank you for your reports!***

~ Reporting Criteria ~

- Hail ¾ inch in diameter (penny size) or larger
- Winds at least 58 mph
- Wind damage
- Tornado
- Funnel Cloud
- Flood or Flash Flooding
- Fog with visibilities under ¼ mile
- Snow of 6 inches or more in 12 hours or 8 inches or more in 24 hours below 6000 feet (7000 feet in Beaverhead, Madison, and Gallatin Counties)
- Snow of 8 inches or more in 12 hours or 12 inches or more in 24 hours above 6000 feet (7000 feet in Beaverhead, Madison, and Gallatin Counties)

The National Weather Service - Incident Meteorologist

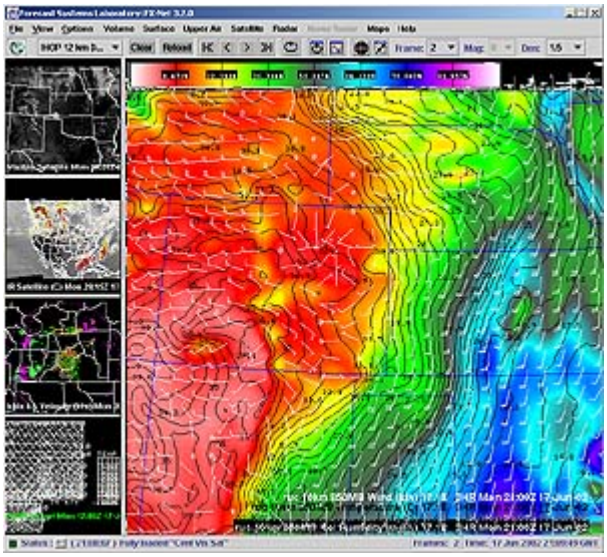
By Bob Hoenisch

The National Weather Service's Incident Meteorologists, or IMETs, are a group of scientists specially trained to go to wildfires and other incidents and provide weather briefings and forecasts to incident responders and command staff. The forecasts provided by on-site Incident Meteorologists help ensure a greater level of safety and allow responders to take into account one of the most changeable aspects of any incident—the weather.

The IMET briefs the Incident Command Staff and incident responders on what weather they can expect that day, highlighting any weather that may severely impact operations or safety.

Every year, IMETs are deployed to support hundreds of wildfires nationwide, helping the on-scene fire management teams to obtain and interpret weather information, train fire personnel on how weather may affect their operations during critical fire situations, and ensure the safety of fire fighters. IMETs receive special training in micro-scale forecasting, fire behavior and fire operations, which makes these fires weather forecasters a key member of the fire management team.

Incident weather support, in the form of forecasts and observations, is accomplished by the use of portable meteorological equipment. This equipment includes the All-hazards Meteorological Response System



AMRS—The All-hazards Meteorological Response System or AMRS equipment consists of a laptop computer and a small, portable satellite dish, about the same size as the laptop. This allows IMETs to download weather data from the Internet nearly anywhere in the world. The laptop includes an advanced software package which includes a program called FX-net that mimics the software used in Weather Forecast Offices. IMETs use FX-net to look at model data, satellite data, radar data, sounder data, lightning data, and surface and upper air observation data. This allows IMETs to work with data in real time, thus shaving precious minutes off any weather alerts that may affect an incident.

ATMU—The Atmospheric Theodolite Meteorological Unit or ATMU is composed of a theodolite (an instrument that is used in surveying and is used to find vertical and horizontal angles), tripod, weather balloons and miscellaneous tools for observing wind speed and direction at various heights above the incident location. Pilot Balloons, also called PIBALs, are launched and tracked by the IMET using the theodolite, allowing IMETs to take upper air observations at an incident, in order to determine what the winds aloft are at that location and what the winds might do later in the day.

(AMRS), the Atmospheric Theodolite Meteorological Unit (ATMU), and Fire Remote Automated Weather Stations (FireRAWS).

FireRAWS: Fire Remote Automated Weather Stations (FireRAWS) are portable weather stations available to the IMET from a special unit within the Bureau of Land Management. These stations are intended for use on or near the fire line or hazardous materials (hazmat) release, and are easily relocated to points desired by the IMET. The stations continually measure temperature, relative humidity, wind speed and direction, and fuel moisture content. FireRAWS will also alert the forecaster and fire crews (through two-way radio) of rapidly changing weather conditions, such as strong wind gusts.

The IMET's day typically begins around 5 a.m., which means the IMET is one of the first at the scene to get up in the morning. The IMET checks overnight weather observations and weather model data and ensures that his/her forecast is still on track and ready. The first briefing typically takes place around 6 a.m. The IMET briefs the Incident Command Staff and incident responders on what weather they can expect that day, highlighting any weather that may severely impact operations or safety.

After the morning briefing, the IMET begins to look at the morning model runs. If an incident is running a night shift, this is the time the IMET works on the evening forecast. Around 10 a.m., the Incident Command Staff holds a planning briefing for the next operational shift (if there is a night shift). The IMET briefs staff on what weather they can expect for the next several days, so they can plan on how to best work the incident.

The IMET conducts a weather watch and begins to prepare the next day's forecast. The next briefing, if there is a night shift, is at around 6 p.m. At this briefing the IMET informs staff and responders on what weather to expect overnight. At around 7 p.m., the IMET briefs the command staff on expected weather for the next several days at the evening planning briefing. After this briefing, the IMET must complete his/her forecast for the next day and update his/her logs for the day.

Throughout the day, the IMET keeps a close watch on the weather and will issue weather alerts if any sudden changes occur that could pose a danger to the incident. The IMET works with field observers on the incident who collect weather data while mapping the fire perimeter. The IMET may also travel to the fire to take observations and observe how the weather is impacting fire behavior and to better understand how the local terrain is affecting the weather. The IMET will also be involved in setting up and choosing locations for the deployment of FireRAWS stations within the fire area. Command staff may ask the IMET for weather information at any time in order to develop plans on how they will work a particular spot of an incident.

The IMET will often be interviewed by the local media and also may have to attend information meetings with the local community. Working in a camp can be tough duty, with extreme temperature changes often the case between night and day; dusty, dry conditions (or wet, muddy conditions sometimes); and the inevitable "camp crud" (typically some strain of flu) that normally makes its way through a camp with close quarters and low-hygiene conditions. The stress level on these incidents is normally elevated as well. Responders are stressed about the incident, and the IMET is stressed about the weather's impact on the safety of the responders. Also, multi-million dollar decisions may be made depending on what the IMET is forecasting. Another added stress is the fact that the IMET is in direct contact with his/her customers, which means the IMET gets instant feedback on how well he/she is doing, and it puts a personal face on the situation. One wrong forecast could very well mean that some of the people the IMET is briefing in the morning might not come back that night. However, these same stress factors are considered a challenge to the IMET and this is what motivates him/her to give the most accurate forecast and best service possible to the incident and firefighters that are engaging the fire.

Is 2 inches of snow worse than 6 inches of snow?

By John Blank

The National Weather Service issues a variety of products during the winter to raise the public's awareness of upcoming events. Generally the issuance of these products is based primarily on snowfall amounts. For example over the western plains of Montana a heavy snow warning is issued for snowfall amounts of 6 inches in a 12-hour period, and 8 inches in a 24-hour period. Snow advisories are generally issued for snowfall amounts of 2 to 5 inches in a 12-hour period. While it is generally the case that the greater the snowfall, the higher the impact to the public, there are situations when additional factors can modify the effects of a winter event. One of these effects is wind. Another modifying effect is road pavement temperature which can exasperate or minimize the effect of snowfall on travelers.

The study found that there were a disproportionately high number of accidents when there was melting/ re-freezing ...

In recent years, states' Department of Transportations (DOT) have installed weather sensors to assist their operations. These sensors measure various aspects of the road surface itself (for example road pavement temperature), in addition to air temperature, dew point, and wind. Some sites have cameras which show the condition of the road surface. The information from these sensors can often be found on the internet and have aided travelers in making decisions, not only if they want to travel, but what route they might want to take.

National Weather Service forecasters have used basic knowledge of pavement temperatures in the past in some of their winter weather warnings/ advisories. For example, sometimes the phrase "snow accumulation mainly on grassy surfaces" has been used. This statement is typically employed during fall and spring events when relatively warm ground (including road temperatures) melts snowfall. By using this phrase, forecasters have attempted to downplay the impact of snowfall on travelers. However there are instances when road temperatures can worsen the effects of a snowfall.

Recently a study was conducted of snowfall events in eastern Montana and eastern Washington, focusing on road pavement temperatures and their impact on accident statistics. Three scenarios were investigated. In the first, road pavement temperatures stayed above freezing during the snowfall so there was melting of the snow. In the second, road pavement temperatures were above freezing at the beginning of the snowfall, and then fell below freezing. Above freezing temperatures initially melted the falling snow, then when the road temperature fell below freezing, the melted snow froze resulting in hazardous ice-covered roads. In the third scenario, road pavement temperatures stayed below freezing. Thus there was no melting or re-freezing, just packed snow.

The study found that there were a disproportionately high number of accidents when there was melting/re-freezing (second scenario) in comparison to the other scenarios. The melting/re-freezing events resulted in higher impact on travel than events when snowfall was greater but did not create icy conditions. The type of event when there is melting of snowfall then refreezing can be found at times during the late afternoon/early evening in the late fall/early winter. Snowfall melts during the mid-afternoon when road pavement temperatures are above freezing, but as the sun sets, the road pavement temperature falls below freezing and the snow re-freezes. This situation coincides with the late afternoon/early evening rush hour. For this particular situation, due to the high impact on travel, the National Weather Service in Great Falls will now consider the issuance of a snow advisory for snowfall amounts of less than 2 inches.

For information on Montana road conditions, call

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A Spotter's Tale

By Don Emanuel

Have you ever wondered what becomes of the spotter report that you give to the Weather Service?

The number one priority of the National Weather Service is to save lives and property. In order to accomplish this, we issue warnings. Whether it is a severe thunderstorm warning or a winter storm warning or a flood warning or even a high wind warning, a warning is issued when a situation requires immediate action. In order to gauge the effectiveness of our warnings and in an effort to cut down on false alarms, the National Weather Service tries to verify each warning that it issues. And that is where you, the spotter, play an important role. We rely on your reports of large hail or heavy snow, high winds or any unusual weather occurrence. Your reports help us verify each warning that we issue and help us get an accurate picture of what really happened.

But spotter reports do not end at the local forecast office. Spotter reports are used in the compilation of a storm data report that is prepared each month at each forecast office for their area of responsibility. These storm data reports are then sent to the National Climatic Data Center in Asheville, North Carolina which is the official repository of all weather data in the United States. The Climatic Data Center prepares a monthly storm report. This document contains a chronological listing, by states, of storm occurrences and unusual weather phenomena as reported by spotters all across the country. The report contains information on storm paths, deaths, injuries and property damage. A special section of each report highlights an outstanding storm of the month. This feature focuses on a particular storm or event using photographs, illustrations and narratives.

You may access the National Climatic Data Center via the internet (http://www.ncdc.noaa.gov). Once you get to their site you may search their data base to find various types of storms and weather phenomena recorded in your county or anywhere else in the country. The monthly storm data reports can be purchased from the Climatic Data Center for a nominal fee. So you can see that the Weather Service depends on your timely and accurate spotter reports to help verify our warnings and to help add details to an ever changing weather story. For that, we say many thanks!

National Climatic Data Center
U.S. Department of Commerce

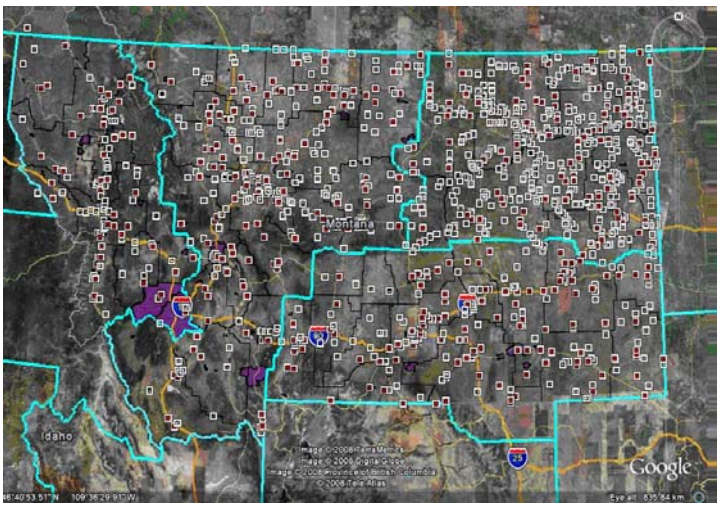
What do we issue?

- **Severe Thunderstorm Watches and Warnings**—Thunderstorms with wind gusts of 58 mph or higher or causing wind damage
- **Tornado Warnings**
- **Flood and Flash Flood Watches and Warnings**—Flooding due to snow melt, heavy rain, etc.
- **Winter Weather Advisories**—Snow accumulations of 2 to 6 inches elevations below 6000 feet (below 7000 feet in Beaverhead, Madison, and Gallatin Counties) or a combination of snow and blowing snow with ¼ mile visibilities for less than 3 hours.
- **Winter Storm Warnings** (for elevations below 6000 feet (7000 feet in Beaverhead, Madison, and Gallatin Counties))—Snow accumulations of 6 inches or more in 12 hours, or 8 inches or more in 24 hours
- **Winter Storm Warnings** (for elevations above 6000 feet (7000 feet in Beaverhead, Madison, and Gallatin Counties))—Snow accumulations of 8 inches or more in 12 hours, or 12 inches or more in 24 hours, or a combination of snow and wind gusts at least 58 mph.
- **Blizzard Warnings**—Snow and wind combinations that reduce visibilities to under ¼ mile for more than 3 hours.
- **High Wind Warnings**—Non-thunderstorm wind gusts at least 58 mph.

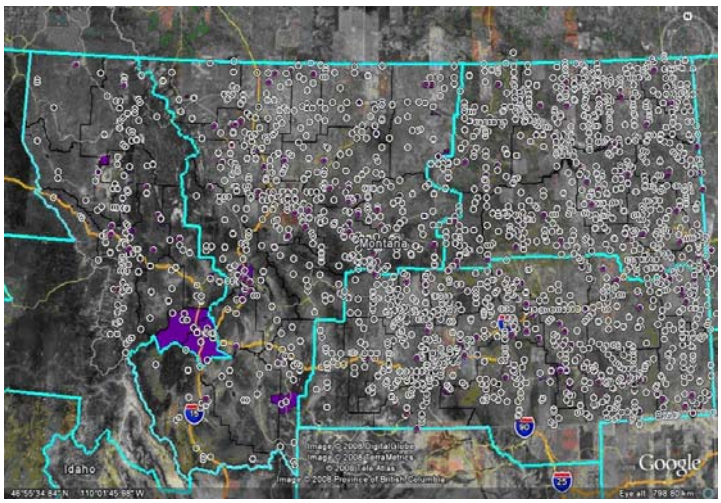
Severe Thunderstorms in Montana

By Ariel Cohen

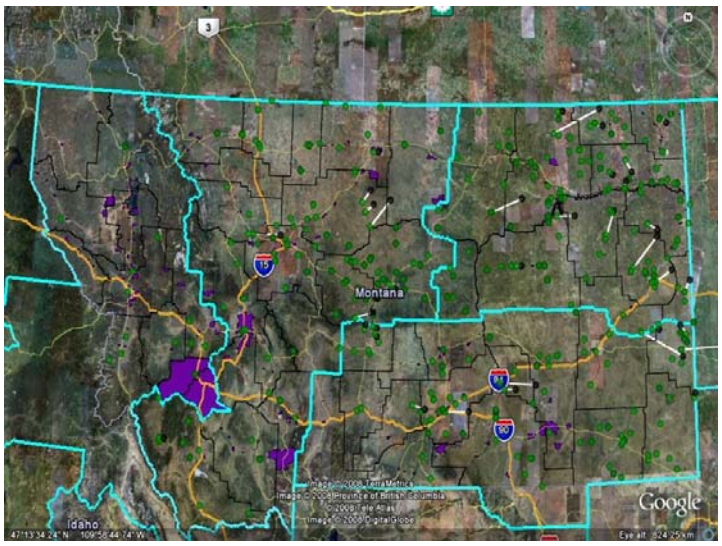
While the majority of severe thunderstorms the United States have historically occurred southeast of Montana, Montana is certainly no stranger to severe weather. Below is a series of images that document severe weather—thunderstorm wind gusts at least 58 mph or wind damage, hail greater than or equal to the size of a penny and tornadoes. These images were created using Geographic Information System, Google Earth, and the Storm Prediction Center's severe weather database. Light blue borders show NWS office area of forecast and warning responsibility borders, with that for NWS Great Falls in the center, NWS Missoula in the west, NWS Glasgow in the northeast, and NWS Billings in the southeast, and common purple shading shows areas of high population density.



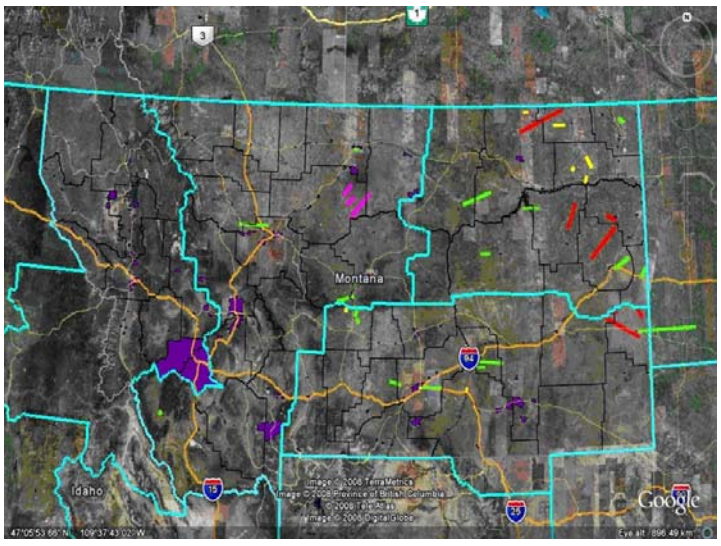
Severe wind reports (white) including 65-knot or more reports (dark red) across Montana from 1955 to 2006.



Severe hail reports (white) including 2-inch diameter or larger (light purple) across Montana from 1955 to 2006.



Tornado touchdown points (green), lift points (yellow), and tracks (white) across Montana from 1950 to 2006.



Tornado intensity reports across Montana showing intensity reports – F0 (green), F1 (yellow), F2 (red) and F3 (pink) from 1950 to 2006.

For more weather information
check out our website at
weather.gov/greatfalls